

### **Amendments to the Claims**

Please cancel claims 2194 and 5176 without prejudice.

The following listing of claims will replace all prior versions and/or listings of claims in the application:

#### **Listing of Claims:**

1-2192. (cancelled)

2193. (currently amended): A method of treating a coal formation in situ, comprising:  
providing heat from ~~one~~ two or more heaters to at least a section of the formation;  
allowing the heat to transfer from ~~one or more~~ at least two of the heaters to a part of the formation such that a permeability of at least some of the part of the formation increases to greater than about 100 millidarcy, wherein superposition of heat from at least two of the heaters pyrolyzes at least some hydrocarbons in the part of the formation; and  
controlling a pressure in at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2194. (cancelled)

2195. (previously presented): The method of claim 2193, further comprising maintaining a temperature in the part of the formation in a pyrolysis temperature range.

2196. (previously presented): The method of claim 2193, wherein at least one of the heaters comprises an electrical heater.

2197. (previously presented): The method of claim 2193, wherein at least one of the heaters comprises a surface burner.

2198. (previously presented): The method of claim 2193, wherein at least one of the heaters comprises a flameless distributed combustor.

2199. (previously presented): The method of claim 2193, wherein at least one of the heaters comprises a natural distributed combustor.

2200. (cancelled)

2201. (previously presented): The method of claim 2193, further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day in a pyrolysis temperature range.

2202. (currently amended): The method of claim 2193, wherein providing heat from ~~one~~two or more of the heaters to at least the section of the formation comprises:

heating a selected volume ( $V$ ) of the coal formation from ~~one~~two or more of the heaters, wherein the formation has an average heat capacity ( $C_v$ ), and wherein the heating pyrolyzes at least some hydrocarbons in the selected volume of the formation; and

wherein heating energy/day ( $Pwr$ ) provided to the selected volume is equal to or less than  $h \cdot V \cdot C_v \cdot \rho_B$ , wherein  $\rho_B$  is formation bulk density, and wherein an average heating rate ( $h$ ) of the selected volume is about 10 °C/day.

2203. (original): The method of claim 2193, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2204. (currently amended): The method of claim 2193, wherein providing heat from ~~one~~two or more of the heaters increases a thermal conductivity of at least a portion of the part of the formation to greater than about 0.5 W/(m °C).

2205. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2206. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2207. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

2208. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2209. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2210. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2211. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5

% by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2212. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2213. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2214. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2215. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2216. (previously presented): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

2217. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2218. (original): The method of claim 2193, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2219. (cancelled)

2220. (previously presented): The method of claim 2193, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H<sub>2</sub> in the mixture is greater than about 0.5 bar.

2221. (previously presented): The method of claim 2220, wherein the partial pressure of H<sub>2</sub> in the mixture is measured when the mixture is at a production well.

2222. (previously presented): The method of claim 2193, further comprising altering a pressure in the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2223. (original): The method of claim 2193, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2224. (previously presented): The method of claim 2193, further comprising:  
providing hydrogen (H<sub>2</sub>) to the heated part to hydrogenate hydrocarbons in the part; and  
heating a portion of the part with heat from hydrogenation.

2225. (previously presented): The method of claim 2193, further comprising:

producing hydrogen (H<sub>2</sub>) and condensable hydrocarbons from the formation; and  
hydrogenating a portion of the produced condensable hydrocarbons with at least a portion  
of the produced hydrogen.

2226. (previously presented): The method of claim 2193, further comprising increasing a  
permeability of a majority of the part of the formation to greater than about 5 Darcy.

2227. (previously presented): The method of claim 2193, wherein allowing the heat to transfer  
increases a permeability of a majority of the part of the formation such that the permeability of  
the part is substantially uniform.

2228. (original): The method of claim 2193, further comprising controlling the heat to yield  
greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2229. (previously presented): The method of claim 2193, further comprising producing a  
mixture in a production well, wherein at least about 7 heaters are disposed in the formation for  
each production well.

2230. (previously presented): The method of claim 2193, further comprising providing heat  
from three or more heaters to at least a portion of the formation, wherein three or more of the  
heaters are located in the formation in a unit of heaters, and wherein the unit of heaters comprises  
a triangular pattern.

2231. (previously presented): The method of claim 2193, further comprising providing heat  
from three or more heaters to at least a portion of the formation, wherein three or more of the  
heaters are located in the formation in a unit of heaters, wherein the unit of heaters comprises a  
triangular pattern, and wherein a plurality of the units are repeated over an area of the formation  
to form a repetitive pattern of units.

2232. (previously presented): A method of treating a coal formation in situ, comprising:

providing heat from one or more heaters to at least a section of the formation;

allowing the heat to transfer from one or more of the heaters to a part of the formation to increase a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform; and

controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day in a pyrolysis temperature range.

2233. (previously presented): The method of claim 2232, wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least the two heaters pyrolyzes at least some hydrocarbons in the part of the formation.

2234. (previously presented): The method of claim 2232, further comprising maintaining a temperature in the part of the formation in a pyrolysis temperature range.

2235. (previously presented): The method of claim 2232, wherein at least one of the heaters comprises an electrical heater.

2236. (previously presented): The method of claim 2232, wherein at least one of the heaters comprises a surface burner.

2237. (previously presented): The method of claim 2232, wherein at least one of the heaters comprises a flameless distributed combustor.

2238. (previously presented): The method of claim 2232, wherein at least one of the heaters comprises a natural distributed combustor.

2239. (cancelled)

2240. (cancelled)

2241. (previously presented): The method of claim 2232, wherein providing heat from one or more of the heaters to at least the section of the formation comprises:

heating a selected volume ( $V$ ) of the coal formation from one or more of the heaters, wherein the formation has an average heat capacity ( $C_v$ ), and wherein the heating pyrolyzes at least some hydrocarbons in the selected volume of the formation; and

wherein heating energy/day ( $Pwr$ ) provided to the selected volume is equal to or less than  $h \cdot V \cdot C_v \cdot \rho_B$ , wherein  $\rho_B$  is formation bulk density, and wherein an average heating rate ( $h$ ) of the selected volume is about 1 °C/day.

2242. (original): The method of claim 2232, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

2243. (previously presented): The method of claim 2232, wherein providing heat from one or more of the heaters increases a thermal conductivity of at least a portion of the part of the formation to greater than about 0.5 W/(m °C).

2244. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

2245. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

2246. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.



2247. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

2248. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

2249. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

2250. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

2251. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

2252. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

2253. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

2254. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

2255. (previously presented): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

2256. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

2257. (original): The method of claim 2232, further comprising producing a mixture from the formation, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

2258. (previously presented): The method of claim 2232, further comprising controlling a pressure in at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2259. (previously presented): The method of claim 2232, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of  $H_2$  in the mixture is greater than about 0.5 bar.

2260. (previously presented): The method of claim 2232, further comprising producing a mixture from the formation, wherein a partial pressure of  $H_2$  in the mixture is measured when the mixture is at a production well.

2261. (previously presented): The method of claim 2232, further comprising altering a pressure in the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

2262. (original): The method of claim 2232, further comprising producing a mixture from the formation and controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

2263. (previously presented): The method of claim 2232, further comprising:  
providing hydrogen ( $H_2$ ) to the heated part to hydrogenate hydrocarbons in the part; and  
heating a portion of the part with heat from hydrogenation.

2264. (previously presented): The method of claim 2232, further comprising:  
producing hydrogen ( $H_2$ ) and condensable hydrocarbons from the formation; and  
hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

2265. (previously presented): The method of claim 2232, wherein allowing the heat to transfer increases a permeability of a majority of the part of the formation to greater than about 100 millidarcy.

2266. (original): The method of claim 2232, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

2267. (previously presented): The method of claim 2232, further comprising producing a mixture in a production well, wherein at least about 7 heaters are disposed in the formation for each production well.

2268. (previously presented): The method of claim 2232, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, and wherein the unit of heaters comprises a triangular pattern.

2269. (previously presented): The method of claim 2232, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, wherein the unit of heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2270-5080. (cancelled)

5081. (previously presented): A method for treating hydrocarbons in at least a section of a coal formation, wherein the section has an average permeability of less than about 10 millidarcy, comprising:

- providing heat from one or more heaters to the formation;

- allowing the heat to transfer from one or more of the heaters to a part of the formation such that heat from one or more of the heaters pyrolyzes at least some hydrocarbons in the part of the formation, and wherein heat from one or more of the heaters increases the permeability of at least a portion of the part of the formation;

- producing a mixture comprising hydrocarbons from the formation;

- monitoring a composition of the produced mixture; and

controlling a pressure in at least some of the formation to control the composition of the produced mixture.

5082. (previously presented): The method of claim 5081, wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least the two heaters pyrolyzes at least some hydrocarbons in the part of the formation, and wherein superposition of heat from at least the two heaters increases the permeability of at least the portion of the part of the formation.

5083. (previously presented): The method of claim 5081, further comprising allowing heat to transfer from at least one of the heaters to the part of the formation to create thermal fractures in the formation, wherein the thermal fractures substantially increase the permeability of the part of the formation.

5084. (currently amended): The method of claim ~~5181~~5081, wherein the heat is provided such that an average temperature in the part of the formation ranges from about 270 °C to about 400 °C.

5085. (previously presented): The method of claim 5081, wherein at least one of the heaters comprises an electrical heater located in the formation.

5086. (previously presented): The method of claim 5081, wherein at least one of the heaters is located in a heater well, and wherein at least one of the heater wells comprises a conduit located in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5087. (previously presented): The method of claim 5081, wherein at least some of the heaters are arranged in a triangular pattern.

5088. (cancelled)

5089. (currently amended): The method of ~~claim 5088~~claim 5081, wherein the pressure is controlled by a valve proximate to a location where the mixture is produced.

5090. (previously presented): The method of claim 5081, wherein the pressure is controlled such that pressure proximate to one or more of the heaters is greater than a pressure proximate to a location where the fluid is produced.

5091-5149. (cancelled)

5150. (previously presented): A method of treating a coal formation in situ, comprising:  
providing heat from one or more heaters to at least a section of the formation;  
allowing the heat to transfer from one or more of the heaters to a part of the formation such that a permeability of at least some of the part of the formation increases to greater than about 100 millidarcy;  
controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day in a pyrolysis temperature range; and  
controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H<sub>2</sub> in the mixture is greater than about 0.5 bar.

5151. (previously presented): The method of claim 5150, wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least the two heaters pyrolyzes at least some hydrocarbons in the part of the formation.

5152. (previously presented): The method of claim 5150, further comprising maintaining a temperature in the part of the formation in a pyrolysis temperature range.

5153. (previously presented): The method of claim 5150, further comprising controlling a pressure and a temperature in at least a majority of the part of the formation, wherein the pressure

is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

5154. (cancelled)

5155. (previously presented): The method of claim 5150, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

5156. (previously presented): The method of claim 5150, wherein providing heat from one or more of the heaters increases a thermal conductivity of at least a portion of the part of the formation to greater than about 0.5 W/(m °C).

5157. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

5158. (previously presented): The method of claim 5150, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

5159. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

5160. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

5161. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

5162. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

5163. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

5164. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

5165. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

5166. (previously presented): The method of claim 5150, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

5167. (previously presented): The method of claim 5150, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure, and wherein the



molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

5168. (previously presented): The method of claim 5150, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

5169. (previously presented): The method of claim 5150, further comprising controlling a pressure in at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

5170. (previously presented): The method of claim 5150, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

5171. (previously presented): The method of claim 5150, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

5172. (previously presented): The method of claim 5150, wherein allowing the heat to transfer increases a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

5173. (previously presented): The method of claim 5150, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

5174. (previously presented): The method of claim 5150, further comprising producing a mixture in a production well, wherein at least about 7 heaters are disposed in the formation for each production well.

5175. (currently amended): A method of treating a coal formation in situ, comprising:  
providing heat from ~~one~~two or more heaters to at least a section of the formation;  
allowing the heat to transfer from ~~one~~two or more of the heaters to a part of the  
formation such that a permeability of at least some of the part of the formation increases to  
greater than about 100 millidarcy, and wherein superposition of heat from at least two of the  
heaters pyrolyzes at least some hydrocarbons in the part of the formation;  
controlling a pressure in at least a majority of the part of the formation, wherein the  
controlled pressure is at least about 2.0 bar absolute; and  
producing a mixture from the formation, wherein the produced mixture comprises non-  
condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable  
hydrocarbons ranges from about 0.001 to about 0.15.

5176. (cancelled)

5177. (previously presented): The method of claim 5175, further comprising maintaining a  
temperature in the part of the formation in a pyrolysis temperature range.

5178. (previously presented): The method of claim 5175, further comprising controlling a  
pressure and a temperature in at least a majority of the part of the formation, wherein the pressure  
is controlled as a function of temperature, or the temperature is controlled as a function of  
pressure.

5179. (previously presented): The method of claim 5175, further comprising controlling the  
heat such that an average heating rate of the part of the formation is less than about 1 °C per day  
in a pyrolysis temperature range.

5180. (previously presented): The method of claim 5175, wherein allowing the heat to transfer  
comprises transferring heat substantially by conduction.

5181. (previously presented): The method of claim 5175, wherein providing heat from ~~one~~two

or more of the heaters increases a thermal conductivity of at least a portion of the part of the formation to greater than about 0.5 W/(m °C).

5182. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

5183. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

5184. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

5185. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

5186. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

5187. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

5188. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

5189. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

5190. (previously presented): The method of claim 5175, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

5191. (previously presented): The method of claim 5175, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

5192. (previously presented): The method of claim 5175, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

5193. (cancelled)

5194. (previously presented): The method of claim 5175, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H<sub>2</sub> in the mixture is greater than about 0.5 bar.

5195. (previously presented): The method of claim 5175, further comprising altering a pressure in the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

5196. (previously presented): The method of claim 5175, wherein allowing the heat to transfer increases a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

5197. (previously presented): The method of claim 5175, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by Fischer Assay.

5198. (previously presented): The method of claim 5175, further comprising producing a mixture in a production well, wherein at least about 7 heaters are disposed in the formation for each production well.

5199. (previously presented): The method of claim 2229, wherein at least about 20 heaters are disposed in the formation for each production well.

5200. (previously presented): The method of claim 2267, wherein at least about 20 heaters are disposed in the formation for each production well.

5201. (previously presented): The method of claim 2193, wherein the part of the formation comprises a selected section.

5202. (previously presented): The method of claim 2193, wherein a pyrolysis zone is established in the part of the formation.

5203. (previously presented): The method of claim 2193, wherein a pyrolysis zone is established in the part of the formation proximate to and/or surrounding at least one of the heaters.

5204. (previously presented): The method of claim 2193, wherein at least one of the heaters is disposed in an open wellbore.

5205. (previously presented): The method of claim 2232, wherein the part of the formation comprises a selected section.

5206. (previously presented): The method of claim 2232, wherein a pyrolysis zone is established in the part of the formation.

5207. (previously presented): The method of claim 2232, wherein a pyrolysis zone is established in the part of the formation proximate to and/or surrounding at least one of the heaters.

5208. (previously presented): The method of claim 2232, wherein at least one of the heaters is disposed in an open wellbore.

5209. (previously presented): The method of claim 5081, wherein the part of the formation comprises a selected section.

5210. (previously presented): The method of claim 5081, wherein a pyrolysis zone is established in the part of the formation.

5211. (previously presented): The method of claim 5081, wherein a pyrolysis zone is established in the part of the formation proximate to and/or surrounding at least one of the heaters.

5212. (previously presented): The method of claim 5081, wherein at least one of the heaters is disposed in an open wellbore.

5213. (previously presented): The method of claim 5174, wherein at least about 20 heaters are disposed in the formation for each production well.

5214. (previously presented): The method of claim 5150, wherein the part of the formation comprises a selected section.

5215. (previously presented): The method of claim 5150, wherein a pyrolysis zone is established in the part of the formation.

5216. (previously presented): The method of claim 5150, wherein a pyrolysis zone is established in the part of the formation proximate to and/or surrounding at least one of the heaters.

5217. (previously presented): The method of claim 5150, wherein at least one of the heaters is disposed in an open wellbore.

5218. (previously presented): The method of claim 5198, wherein at least about 20 heaters are disposed in the formation for each production well.

5219. (previously presented): The method of claim 5175, wherein the part of the formation comprises a selected section.

5220. (previously presented): The method of claim 5175, wherein a pyrolysis zone is established in the part of the formation.

5221. (previously presented): The method of claim 5175, wherein a pyrolysis zone is established in the part of the formation proximate to and/or surrounding at least one of the heaters.

5222. (previously presented): The method of claim 5175, wherein at least one of the heaters is disposed in an open wellbore.

5223. (previously presented): The method of claim 2193, further comprising providing hydrogen ( $H_2$ ) to the heated part of the formation to hydrogenate hydrocarbons in the part.

5224. (previously presented): The method of claim 2232, further comprising providing hydrogen ( $H_2$ ) to the heated part of the formation to hydrogenate hydrocarbons in the part.

5225. (previously presented): The method of claim 5081, further comprising providing hydrogen ( $H_2$ ) to the heated part of the formation to hydrogenate hydrocarbons in the part.

5226. (previously presented): The method of claim 5150, further comprising providing hydrogen ( $H_2$ ) to the heated part of the formation to hydrogenate hydrocarbons in the part.

5227. (previously presented): The method of claim 5175, further comprising providing hydrogen ( $H_2$ ) to the heated part of the formation to hydrogenate hydrocarbons in the part.